CLAIMS:

1. A tissue extraction and maceration device, comprising:

an outer tube having a substantially open distal end that is adapted to be placed on a tissue surface;

a shaft rotatably disposed within the outer tube and movable between a first, proximal position in which the shaft is fully disposed within the outer tube, and a second, distal position in which a portion of a distal end of the shaft extends through the opening in the distal end of the outer tube;

a tissue harvesting tip formed on the distal end of the shaft, the tissue harvesting tip being effective to excise a tissue sample; and

a cutting member coupled to the shaft at a position proximal to the tissue harvesting tip, the cutting member being effective to macerate a tissue sample excised by the tissue harvesting tip.

2. The device of claim 1, further comprising a biasing element effective to bias the shaft to the proximal position.

3. The device of claim 2, further comprising a trigger mechanism connected to the shaft, wherein, upon actuation, the trigger mechanism is effective to overcome the biasing force to move the shaft from the proximal position to the distal position.

4. The device of claim 1, wherein the open distal end of the outer tube is adapted to form a seal with a tissue surface.

5. The device of claim 1, wherein the substantially open distal end of the outer tube is defined by an edge wall that is angled with respect to a longitudinal axis of the outer tube.

6. The device of claim 5, wherein the angle is in the range of about 30° to 75°.

7. The device of claim 5, wherein the angle is about 40°.

8. The device of claim 5, wherein the edge wall includes surface features formed thereon.

9. The device of claim 8, wherein the surface features comprise ridges.

10. The device of claim 1, wherein the cutting member comprises at least one blade member extending radially from the shaft.

11. The device of claim 10, wherein each blade member has a shape selected from the group consisting of a rectangular shape, a curved shaped, a triangular shape, a square shape, an irregular shape, and combinations thereof.

12. The device of claim 1, wherein the harvesting tip comprises a cone-shaped member having a plurality of cutting teeth formed on an outer surface thereof.

13. The device of claim 1, wherein the harvesting tip comprises a substantially semi-cylindrical housing having a cutting surface formed around a periphery thereof.

14. The device of claim 1, wherein the harvesting tip is adapted to penetrate tissue to remove a predetermined volume of tissue when moved from the proximal position to the distal position.

15. The device of claim 14, wherein the predetermined volume of tissue, per tissue sample, is in the range of about 0.5 cm^3 to 1.5 cm^3.

16. The device of claim 14, wherein the predetermined volume of tissue, per tissue sample, is about 0.9 cm^3.

17. The device of claim 1, further comprising a sizing screen disposed within the outer tube and positioned proximal to the harvesting tip and the cutting member of the shaft.

18. The device of claim 17, wherein the sizing screen includes openings formed therein, wherein the openings are defined by a wall having an upstream edge that is effective to cut tissue having a size greater than the circumference of the openings.

19. The device of claim 17, wherein the sizing screen includes openings formed therein and having a diameter in the range of about 0.7 mm to 1.3 mm.

20. The device of claim 17, wherein the sizing screen includes openings formed therein and having a diameter of about 1.0 mm.

21. The device of claim 1, further comprising a driver mechanism coupled to the shaft and effective to rotate the shaft at a speed in the range of about 100 to 5000 rpm.

22. The device of claim 1, wherein the harvesting tip of the shaft is adapted to extend beyond the outer tube by a predetermined distance.

23. The device of claim 22, wherein the predetermined distance is in the range of about 1 mm to 5 mm.

24. The device of claim 22, wherein the predetermined distance is about 3 mm.

25. The device of claim 1, wherein the outer tube is adapted to be coupled to a vacuum pump that is effective to draw tissue through at least a portion of the outer tube.

26. A method for harvesting a tissue sample, comprising:

providing a tissue extraction and preparation device having an outer tube with an open distal end, and a shaft rotatably disposed within the outer tube and including a tissue harvesting tip formed on the distal end thereof and a cutting member coupled to the shaft at a position proximal to the tissue harvesting tip;

coupling a proximal end of the shaft to a driver mechanism;

positioning the open distal end of the outer tube against a tissue surface at a desired tissue sample site;

actuating the driver mechanism to effect rotation of the shaft within the outer tube;

moving the shaft from a proximal position, wherein the harvesting tip of the shaft is disposed within the outer tube, to a distal position, wherein the harvesting tip extends distally from the outer tube to penetrate the tissue surface, thereby causing the harvesting tip to obtain a tissue sample; and

returning the shaft to the proximal position wherein the tissue sample is macerated by the cutting member.

27. The method of claim 26, further comprising the step of coupling the outer tube to a vacuum pump that is effective to draw the macerated tissue sample through at least a portion of the outer tube.

28. The method of claim 26, further comprising the step of coupling the outer tube to a tissue dispensing device that is effective to deposit the macerated tissue sample onto a tissue scaffold.

29. The method of claim 26, wherein the device further includes a biasing element that is effective to bias the shaft to the proximal position.

30. The method of claim 29, wherein the device further includes a trigger mechanism that, upon actuation, is effect to overcome the biasing force to move the shaft from the proximal position to the distal position.